ART. 8. NOTES ON PLEISTOCENE VERTEBRATES FROM WYTHE COUNTY, VIRGINIA

By John E. Guilday
Assistant Curator of Comparative Anatomy
Carnegie Museum

In or about the year 1868 Edward D. Cope collected samples of Pleistocene cave breccia from three localities on the eastern side of the Shenandoah Valley in Wythe County, Virginia. ". . . two of them near together, on the property of Abraham Painter, and the third about three miles on the same side of the same ridge. The Kanawha (New) River cuts the hill at the latter point, and on the side of a bluff the cavity occurred . . ." (E. D. Cope, 1869a, p. 171). Upon application to the county surveyor, O. P. Hay learned that the Painter Farm was along the New River near the town of Ivanhoe. (O. P. Hay, 1923, p. 353). According to Dr. Jean Lowry, former district geologist, Commonwealth of Virginia, (letter) the Painter Farm now belongs to a Mr. Early, and Cope's fossil sites are known as Early's Cave, or Early's Pits.

Cope identified 21 species of mammals, one bird *sp., Crotalus, Tropidonotus (=Thamnophis?), Trionyx, Cistudo (=Terrapene), Menopoma (=Cryptobranchus),* fragment of a pelecypod and 7 species of land snails. The specimens were present as inclusions in the dark brown breccia. Angular fragments of quartzite and wild cherry seeds ("Celtis pumila", Cope, 1869a, p. 173) also occurred as inclusions. The bones and teeth were poorly preserved and unmineralized.

O. P. Hay, (1923, p. 351) is of the opinion that the age is ". . . somewhere about the middle of the Pleistocene." Certainly the presence of *Megalonyx, Equus,* and *Tapirus* place the fauna in the Pleistocene, probably in an interglacial. Unfortunately there are, as Cope states, three different localities involved so that the collection can not be viewed as a single fauna. Each locality may have represented a different time interval. Hay's opinion of the age of this collection is about as exact as the situation warrants. There is no collaborative geological evidence.

I wish to thank the authorities at the American Museum of Natural History, especially Dr. Malcolm C. McKenna, for permission to study the collection, and Dr. Craig C. Black, Associate Curator of Vertebrate Fossils, and Miss Caroline A. Heppenstall, Assistant Curator of Mammals at Carnegie Museum for their assistance.

Cope described two new genera and five new species of Pleistocene mammals from this collection, all of them invalid. The collection itself is incomplete at the present time. Various specimens were apparently lost. Indeed, Cope himself lost one of them prior to publication. Twelve of the 21 mammals originally described are still in the collection, including the types of *Stereodectes tortus* Cope (=*Marmota monax* Gmelin), *Tamias laevidens* Cope [=*Tamias striatus* (Linnaeus)], *and Sciurus panolius* Cope [=*Glaucomys volans* (Linnaeus)].

In the list below some of the italicization follows Cope.

Annotated list of the collection as it exists today, with a revision of the taxonomic standing of some of the forms:

Submitted for publication, August 21, 1961
Issued February 23, 1962

Class: Mammalia
Order: Insectivora
Family: Soricidae
Blarina cf. *brevicauda* (Say)
Blarina *sp.* Cope, 1869a, p. 175
Material: 1 mandible with complete dentition ". . . about the size . . . of *B. talpoides.*" Specimen lost.

Order: Chiroptera
Family: Vespertilionidae, sp. ?
Vespertilio, sp. Cope, 1869a, p. 176
Material: "numerous bones". Specimens lost.

Order: Edentata
Family: Megalonychidae
Megalonyx cf. *jeffersonii* Harlan
Megalonyx jeffersonii Harlan. Cope, 1869a, p. 172
Material: "fragments of teeth". Specimens lost.

Order: Lagomorpha
Family: Leporidae, gen, et sp.?
Lepus sylvaticus, *Bach.* Cope, 1869a, p. 175
Sylvilagus floridanus. O. P. Hay, 1923, p. 353
Material: A.M.N.H. 8072. Two fragmentary right mandibles and right p^4-m^1.
Remarks: These fragmentary jaws and teeth agree with modern *Sylvilagus floridanus.* But the material is not diagnostic. Mandibles of *Sylvilagus transitionalis* and those of the small, late Pleistocene form of *Lepus americanus (See* Guilday and Bender, 1960) also agree quite well with the Wythe County fragments. The coranoid process of the mandible is the most reliable single character for separating isolated lower jaws of cottontail rabbits *(Sylvilagus)* and snowshoe hares *(Lepus).* Unfortunately they are not present in the collection. Both genera occurred in the late Pleistocene, Natural Chimney's local fauna, Augusta County, Virginia.

Order: Rodentia
Family: Sciuridae
Marmota cf. *monax* Gmelin
Stereodectes tortus, *Cope, gen. et sp. nov.,* 1869a, p. 172, plate 3, fig. 3 and 3a
Arctomys monax, *Gmel.* Cope, 1869a, p. 173
Marmota monax. O. P. Hay, 1902, p. 871
Material: A.M.N.H. 8082. A partial upper incisor, the type specimen of *Stereodectes tortus* Cope. The specimen that Cope identified as woodchuck, "One nearly perfect ramus mandibuli" is no longer with the collection.
Remarks: *Stereodectes tortus* was described as a new genus and species from an abnormal woodchuck incisor. It is characterized by a lateral twist, reminiscent of a ram's horn, a condition found in rodents that have met with dental

damage and developed an overgrown incisor. Though not common, this condition is by no means rare, and most large mammal collections contain a few examples. Colyer (1936) lists this condition in primates *(Daubentonia),* lagomorphs, rodents, artiodactyls *(Sus, Hippopotamus)* and the hyrax. The degree of tortion of A.M.N.H. 8082 was duplicated in the overgrown incisor of an abnormal woodchuck, C.M. mammal no. 6029.

Tamias cf. *striatus* (Linnaeus)

Tamias laevidens, *Cope, sp. nov.,* 1869a, p. 174, plate 3, fig. 4

Eutamias. T. S. Palmer, 1904, p. 865

Tamias laevidens Cope. O. P. Hay, 1923, p. 353

Material: A.M.N.H. 8081. One partial left mandible with p_4, broken incisor.

Remarks: The type and only specimen is still partially imbedded in breccia, but all of its salient characters can be seen. The jaw appears to have been broken prior to deposition at about the level of the third molar, and only its anterior half is preserved. An unerupted fourth premolar is in place and partially exposed. The molars are missing. The species *T. laevidens* was based upon the following characters—all invalid.

1. "The first molar [fourth lower premolar] has two anterior cusps instead of one." Cope, 1869a, p. 174. The presence of two anterior cusps, protoconid and metaconid, is a character shared by all sciurids, and can not be used to separate members of the genus *Tamias.*

2. "They [the protoconid and metaconid or p_4] are separated by a deep groove." Cope, *ibid.* So they are in all chipmunks.

3. "There is a little cusp between the external two [—cusps, metaconid and hypoconid.]." Cope, *ibid.* This is again typical for the genus.

I can only imagine that Cope used old animals with advanced toothwear for comparative material, otherwise his remarks on the morphology of p_4 are inexplicable.

4. "The incisor teeth are not striate grooved on their anterior face, as in *T. striatus,* . . . " Cope, *ibid.* This varies individually. Cope's specimen is weakly grooved exactly as in my comparative material of *T. striatus.* The incisors of chipmunks of the genus *Eutamias* are strongly striated, and it is possible that Cope had this in mind.

5. "The ramus is more slender [than *T. striatus*]." Cope, *ibid.* The mandible is slender, an impression heightened by its immaturity and broken ventral border, but no more so than in modern *T. striatus.*

Glaucomys cf. *volans* (Linnaeus)

Sciurus panolius *Cope, sp. nov.,* 1869a, p. 174, plate 3, fig. 5

Material: A.M.N.H. 8576. Fragmentary right mandible containing the stump of an incisor and a partial p_4.

Remarks: Cope mentions two molar teeth in the specimen, and his figure shows p_4 and m_1 in position in the jaw. The specimen has been damaged subsequently. The first molar has been sheared off at the roots and the lingual half of the fourth premolar is missing. Only the protoconid and hypoconid of p_4 is preserved, together with a trace of the anterior re-entrant between the protoconid and the metaconid. Cope's description of the missing molar, plus the morphology of the remaining tooth and the mandible itself are diagnostic of *Glaucomys*. The masseteric fossa is relatively deep, and the ventral curve of the incisor, as it passes the dorso-lingual root of the angular process is quite prominent, but both variations occur in modern *Glaucomys*. Size is as in modern *Glaucomys volans*.

Family: Castoridae

Castor canadensis Kuhl

Castor fiber, Linnaeus
C. Canadensis Kuhl } Cope, 1869a, p. 173

Material: "Portion of mandible with three molars." Specimen lost.

Family: Cricetidae

Neotoma cf. *floridana* (Ord)

Neotoma? floridanum, *Say and Ord*. Cope, 1869a, p. 173
Neotoma floridana ? O. P. Hay, 1923, p. 353

Material: A.M.N.H. 8078. Partial left mandible containing m_1, m_2, and incisor.

Remarks: The mandible is from a young individual, undoubtedly a nestling. The mandible was not fully formed and the bone had a porous surface texture. Wear was just beginning on the molars and the occlusal pattern was not yet established. The specimen was compared with a nestling *N. f. magister* from southwestern Pennsylvania, and with the figure of *Parahodomys spelaeus* (in Gidley & Gazin, 1938, p. 61, fig. 33). The animal was obviously a *Neotoma*, but the specimen is too immature and fragmentary for more than a provisional specific identification. Cope mentions an upper molar, incisors, "and other portions," but they are not with the collection now.

Peromyscus, sp. ?

Hesperomys ? leucopus, *Rafinesque*. Cope, 1869a, p. 173
Peromyscus leucopus. O. P. Hay, 1923, p. 353.

Material: "Molar teeth". Specimens lost.

Remarks: Identification of members of this genus to species by the examination of isolated molars is difficult, if not impossible, in many instances. Cope states merely that the teeth were "indistinguishable from those of this common mouse." [*P. leucopus*], Cope, 1869a, p. 173. At the time

Cope made that identification the genus was inadequately known and it is not possible, in the absence of the material, to interpret Cope's remarks in the light of present-day knowledge.

Microtus cf. *pennsylvanicus* (Ord)

Arvicola, *sp. Cope,* 1869a, p. 173

Arvicola riparia. Cope, 1871, p. 87

Microtus pennsylvanicus. O. P. Hay, 1923, p. 353

Material: A.M.N.H. 8077. Fragmentary left mandible with complete dentition.

Remarks: The teeth are inclosed in flowstone but their occlusal surfaces are well exposed. The specimen appears to be a typical *M. pennsylvanicus.* The identification will have to remain provisional, however, because of the difficulty of separating isolated mandibles of *M. pennsylvanicus* and *M. chrotorrhinus.* Both species are known from the late Pleistocene Natural Chimney local fauna in Augusta County, Virginia (Guilday and Bender, *ibid.*). *M. chrotorrhinus* is of boreal affinities and has a relict distribution in the Appalachian Mountains at the present time. Its presence in a Pleistocene deposit at the latitude of southern Virginia and at an elevation of about 1600 feet would be indicative of boreal conditions. The remainder of the fauna seems to be more indicative of a temperate, interglacial episode. But, because there are three localities involved here, direct association of any two species (with the exception of *Equus* and *Ursus)* is questionable, and the collection can not be looked upon as a contemporaneous "fauna".

Order: Carnivora

Family: Ursidae

Ursus (Euarctos), species?

Ursus amplidens, *Leidy. Cope,* 1869a, p. 176

Material: A.M.N.H. 8033. Unworn crown of right lower m_3.

Remarks: Cope identified the specimen as *U. amplidens* with no comment other than the fact that it was "identical with that described by Leidy" [Leidy, 1853]. *U. amplidens,* based on a fragment of a mandible with m_3 and an isolated m_1 found near Natchez, Mississippi, has been referred both to the grizzly *U. ferox,* and to the modern black bear *U. americanus. (See* Erdbrink, 1953). Cope's specimen is larger in all dimensions and more rectangular than 27 m_3's of *U. americanus* from a 17th century archaeological site in eastern Pennsylvania (Pennsylvania State Museum, site no. 36 La 12). The usual shape of m_3, viewed from above, was oval or egg-shaped, but one specimen was found with the rectangular shape of the Wythe County molar. It (G-657) measured, length 16 mm., width 11 mm. The fossil molar, A.M.N.H. 8083 measured,

length 19 mm., width 14 mm. Erdbrink, 1953, p. 309, gives the following observed range for length and width of m_3 in *U. americanus:* length 13-20 mm., width, 10-14 mm. This range is broad enough to include the Wythe County molar as well as some modern grizzly bears. Since students can not agree on the affinities of *U. amplidens,* and since m_3 is so variable in modern bears of the subgenera *Ursus* and *Euarctos,* the Wythe County specimen can not be identified beyond genus. It resembles Leidy's figure of *U. amplidens* no more than its does the modern black bear. It is a bear, probably a euarctoid, but somewhat larger than the present Appalachian form, (based on comparative material from Pennsylvania) and larger than the Pleistocene *U. vitabilis* from Cumberland Cave, Maryland (Gidley & Gazin, 1938, p. 23). *U. vitabilis=U. americanus* according to Erdbrink, 1953, p. 311. Imbedded in the same mass of breccia as A.M.N.H. 8083 is an unerupted lower cheek tooth of *Equus* cf. *complicatus.* This is the only instance in the collection in which two species are in direct association. The association with the horse argues for some antiquity for the bear, and this plus the rectangular shape of the tooth make me hesitate to refer it to a large individual of *U. americanus.* Compared with the m_3 of a modern *U. horribilus* from British Columbia (R. W. Watters, no. 27, Carnegie Museum mammal collection) the Wythe County molar is slightly smaller and does not have the triangular crown view.

Family: Procyonidae

Procyon cf. *lotor* (Linnaeus)

Procyon lotor, *Linnaeus.* Cope, 1869a, p. 176

Material: A.M.N.H. 8079. Right lower m_2 *(not* m_3 as Cope states).

Family: Mustelidae

Spilogale putorius (Linnaeus)

Galera perdicida, Cope, sp. nov., 1869a, p. 177

Hemiacis perdicida, Cope, 1869b, p. 3

Spilogale putorius. Trouessart, 1897, p. 262

Material: One left mandible with dentition. Figured in Cope, 1869a, plate 3, fig. 2. Specimen lost.

Order: ? Carnivora *incertae sedis:*

Mixophagus spelaeus Cope. *nomen dubium*

Mixophagus spelaeus, *Cope,* 1869a, p. 176, plate 3, fig. 2. *(gen. et sp. nov.).*

? Procyon, p., Cope. Trouessart, 1898, p. 252

Myxophagus spelaeus. O. P. Hay, 1923, p. 353

Material: One fragmentary lower molar. Specimen lost.

Remarks: Both the description and the figure of this specimen are inadequate to determine its correct identity. It quite possibly was a broken m_2 of a gray fox, *Urocyon cinereoargenteus.* The type and only specimen is lost. It remains

unidentified, not because of any anatomical peculiarities, but only because of the inadequacy of the material. There appears to have been little ground for the erection of a new genus and species on this single tooth fragment, and it stands as a *nomen dubium*.

Order: Perissodactyla

Family: Equidae

Equus cf. *complicatus,* Leidy

Equus ? complicatus, Leidy
E. americanus, Leidy } Cope, 1869a, p. 176

Equus complicatus ? O. P. Hay, 1923, p. 353

Material: A.M.N.H. 8075. Seven fragments of at least 3 molars. One broken lower cheek tooth, unerupted and without cement, partially imbedded in breccia with bear molar A.M.N.H. 8083.

Remarks: I am merely following Cope's identification. The material is fragmentary, but at least one tooth has been removed from the collection since Cope's time. Since he mentions "Upper and lower milk and permanent molars," he may have had sufficient material to work with. As it stands today, however, the specimens are not identifiable beyond genus.

Family: Tapiridae

Tapirus, species ?

Tapirus haysii, Leidy. Cope, 1869a, p. 176, plate 3, fig. 6 and 6a

Material: A.M.N.H. 8076. One right, one left lower molar partially imbedded in separate pieces of breccia.

Remarks: Both teeth are unworn; each measures 22 mm. in total length and both could possibly have come from the same animal. They appear to be m_2, but I can not be sure. Isolated tapir teeth are sometimes difficult to assign correct dental position. They appear to fall within the size range of *T. terrestris* and *T. veroensis,* and are below the minimum size of *T. copei* from Port Kennedy Cave, Pennsylvania. *(See* G. G. Simpson, 1945, for comparative measurements.) Cope's statement that the specimens "have a rather greater antero-posterior diameter than those of the existing Central and South American species" is incorrect. They agree quite well. *Tapirus haysii* Leidy, a name based upon an isolated molar from North Carolina (?), is to be avoided according to Simpson (1945, p. 65-66) on the grounds that the type material is inadequate to define the species.

Order: Artiodactyla

Family: Tayassuidae

Mylohyus, species ?

Dicotyles nasutus, Leidy. Cope, 1869a, p. 176
Mylohyus nasutus. O. P. Hay, 1923, p. 353

Material: "several molar and canine teeth." Specimens lost.

Remarks: Cope neither figured nor measured the specimens. There were at least two Pleistocene species of *Mylohyus (See* Lundelius, 1960, p. 30) in eastern North America, and, in the absence of the specimens, a reappraisal of Cope's specific identification is not possible.

Family: Cervidae

Odocoileus virginianus (Zimmerman)

Cariacus virginianus, *Gray*, *Cervus*, Bodd. } Cope, 1869a, p. 176

Material: A.M.N.H. 8073. Four upper molars, one broken p_2, one right lower molar, fragment of a left mandible with m_2 in place.

Remarks: At least three animals are represented. The teeth indicate a form slightly smaller than modern Pennsylvania comparative material. Size variation within *O. virginianus* exhibits such extreme clinal variation at the present day that this character can be of little value in determining specific relationships of fossil material.

Family: Bovidae, species ?

Bos ? antiquus, Leidy
Bison, Leidy. } Cope, 1869a, p. 176

Bison sp. indet. O. P. Hay, 1923, p. 353

Material: "Molar teeth." Specimens lost.

Remarks: Cope makes no further reference to the material and its affinity must remain unknown.

Summary: List of species identified from Cope's 1868, Wythe County, Virginia Collection with taxonomic revision. Asterisk indicates specimen lost and not examined by me.

Present paper	*O. P. Hay, 1923*	*E. D. Cope, 1896a*
Amphibia		
Cryptobranchus ? *	*Cryptobranchus sp. indet.*	*Menopoma*
Reptilia		
Crotalus ? *	*Crotalus sp. indet.*	*Crotalus*
Thamnophis ? *	. . .	*Tropidonotus*
Trionyx ? *	*Amyda sp. indet.*	*Trionyx*
Terrapene ? *	*Terrapene sp. indet.*	*Cistudo*
Aves sp. *	. . .	"bird of prey", p. 178
Mammalia		
Blarina cf. *brevicauda* *	*Blarina sp. indet.*	*Blarina* sp.
Vespertilionidae *	*Vespertilio sp. indet.*	*Vespertilio* sp.
Megalonyx cf. *jeffersonii**	*Megalonyx jeffersonii*	*Megalonyx jeffersonii*
Leporidae. gen. et sp. ?	*Sylvilagus floridanus*	*Lepus sylvaticus*
Marmota cf. *monax*	*Marmota monax*	*Stereodectes tortus, gen. et sp. nov.*
		Arctomys monax
Tamias cf. *striatus*	*Tamias laevidens*	*Tamias laevidens, sp. nov.*
Glaucomys cf. *volans*	*Sciurus panolius*	*Sciurus panolius, sp. nov.*
Castor canadensis *	*Castor fiber*	*Castor fiber*
		C. canadensis
Neotoma cf. *floridana*	*Neotoma floridana* ?	*Neotoma* ? *floridanum*

Present paper	*O. P. Hay, 1923*	*E. D. Cope, 1896a*
Peromyscus sp. ?*	*Peromyscus leucopus*	*Hesperomys ? leucopus*
Microtus cf. *pennsylvanicus*	*Microtus pennsylvanicus*	*Arvicola sp.*
Ursus (Euarctos) sp. ?	*Ursus amplidens*	*Ursus amplidens*
Procyon cf. *lotor*	*Procyon lotor*	*Procyon lotor*
Spilogale putorius *	*Spilogale putorius*	*Galera perdicida, sp. nov.*
Carnivora (nomen dubium) *	*Myxophagus spelaeus*	*Mixophagus spelaeus, gen. et sp. nov.*
Equus cf. *complicatus*	*Equus complicatus ?*	*Equus ? complicatus*
Tapirus sp. ?	*Tapirus haysii*	*Tapirus haysii*
Mylohyus sp. ? *	*Mylohyus nasutus*	*Dicotyles nasutus*
Odocoileus virginianus	*Odocoileus virginianus*	*Cariacus virginianus*
Bovidae, sp. ? *	*Bison sp. indet.*	*Bos ? antiquus*
		Bison

One other locality in Wythe County, Virginia, has produced Pleistocene bone since Cope's collection was made. A partial skull and a fragmentary humerus of a peccary, *Platygonus* sp. were recovered from Gardner's Cave, on the L. Y. Gardner Farm, 3½ miles southwest of Wytheville, Virginia. They were donated to the Carnegie Museum (C.M. 6421) by Dr. Lowry. The skull, heavily encased in a yellow, silty breccia, is that of an immature animal. The third upper deciduous molars are just beginning to show signs of occlusal wear. The permanent first molars are in the process of erupting. Measurements appear to fall within the ranges of *P. vetus* and *P. cumberlandensis* as outlined by Gidley, 1921. There is no trace of the intermediary cusps or lophs that, according to Gidley, separates *P. cumberlandensis* from *P. vetus*. The specimen agrees with the published figure of *P. vetus* and, perhaps, should be referred to that species. Simpson (1949) is of the opinion that perhaps all Pleistocene *Platygonus* belong to the single, highly variable species, *P. compressus* LeConte. I prefer to leave the specimen identified only to genus at the present time, and wish merely to call it to the attention of future students.

REFERENCES

Colyer, Sir F.

1936. Variations and diseases of the teeth of animals. John Bale Sons, and Danielssons Ltd., 750 p., London.

Cope, Edward D.

1869a. Synopsis of the extinct mammalia of the cave formations in the United States, with observations on some Myriapoda found in and near the same, and on some extinct mammals of the caves of Anguilla, W. I., and of other localities. Proceedings of the American Philosophical Society, v. 11, p. 171-192, plates 3-5.

1869b. Remarks on fossils from Limestone caves of Virginia. Proceedings of the Academy of Natural Sciences of Philadelphia. v. 21, p. 3.

1871. Preliminary report on the vertebrata discovered in the Port Kennedy bone cave. Proceedings of the American Philosophical Society, v. 12, p. 73-102.

Erdbrink, D. P.

1953. A review of fossil and recent bears of the old world, v. 1, 320 p.

Gidley, J. W.

1921. Pleistocene peccaries from the Cumberland Cave deposit. Proceedings of the United States National Museum, v. 57, no. 2324, p. 651-678.

Gidley, J. W., and C. Lewis Gazin

1938. The Pleistocene vertebrate fauna from Cumberland Cave, Maryland. Bulletin 171, United States National Museum, 99 p.

Guilday, John E., and Martin S. Bender

1960. Late Pleistocene records of the yellow-cheeked vole, *Microtus xanthognathus* (Leach). Annals of Carnegie Museum, v. 35, p. 315-330.

Hay, O. P.

1902. Bibliography and catalogue of the fossil vertebrata of North America. Bulletin of the United States Geological Survey, no. 179, 868 p.

Hay, O. P.

1923. The Pleistocene of North America and its vertebrated animals from the states east of the Mississippi River and from the Canadian provinces east of longitude 95°. Carnegie Institution of Washington, 499 p.

Leidy, J.

1853. On some fossil fragments from Natchez, Mississippi. Proceedings of the Academy of Natural Sciences of Philadelphia, v. 6, p. 303.

Lundelius, Ernest L., Jr.

1960. *Mylohyus nasutus,* long-nosed peccary of the Texas pleistocene. Bulletin Texas Memorial Museum, no. 1, p. 1-40.

Palmer, Theodore S.

1904. Index generum mammalium; a list of the genera and families of mammals. United States Department of Agriculture, North American Fauna, no. 23, 984 p.

Simpson, George G.

1945. Notes on Pleistocene and recent tapirs. Bulletin of the American Museum of Natural History, no. 86, p. 33-82.

1949. Fossil deposit in a cave in St. Louis. American Museum novitates, no. 1408, p. 1-46.

Trouessart, Edouard L.

1897. Catalogue mammalium tam viventium quam fossilium. R. Friedlander und Sohn, Berlin, pt. 2, p. 219-452.